AMENDMENT TO THE CLAIMS

The following listing of claims will replace all previous listings:

Listing of Claims

1. (Original) A method for determining a concentration of a medically significant component of a biological fluid, comprising the:
   a) applying a first signal having an AC component to the biological fluid;
   b) measuring a first response to the first signal;
   c) applying a second signal to the biological fluid, wherein the second signal is a DC signal;
   d) measuring a second response to the second signal; and
   e) combining the first response with the second response to produce an indication of the concentration of the medically significant component.

2. (Original) The method of claim 1, wherein the first signal is an AC signal.

3. (Original) The method of claim 1, wherein the first signal is applied to the fluid before the second signal.

4. (Original) The method of claim 1, wherein the first signal is applied to the fluid after the second signal.

5. (Original) The method of claim 1, wherein the first signal and the second signal are applied at least partially simultaneously.

6. (Original) The method of claim 1, wherein the first response comprises magnitude and phase angle information.

7. (Original) The method of claim 1, wherein the first response comprises an admittance value.

8. (Original) The method of claim 1, wherein the first signal comprises a number of frequencies, wherein the number is greater than one.

9. (Original) The method of claim 8, wherein the number is not less than two and not greater than five.

10. (Original) The method of claim 8, wherein the number is not less than two and not greater than ten.

11. (Original) The method of claim 8, wherein the number is greater than ten.

12. (Original) The method of claim 1, wherein the AC component of the first signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

13. (Original) The method of claim 1, wherein the biological fluid is blood.

14. (Original) The method of claim 1, further comprising reacting the biological fluid with a reagent.

15. (Original) The method of claim 1, wherein the measuring the first response occurs before the measuring the second response.

16. (Original) The method of claim 1, wherein the measuring the first response occurs after the measuring the second response.

17. (Original) The method of claim 1, wherein the DC signal has a magnitude between about 300mV and 550mV.

18. (Original) A method of measuring a biological fluid test sample, the method comprising:

measuring a first electrical response of the biological fluid test sample, the first electrical response having an AC component;

measuring a second electrical response of the test sample; and

determining a value indicative of a glucose concentration of the test sample based at least in part upon the first electrical response and the second electrical response.

19. (Original) The method of claim 18, wherein the first electrical response is an AC signal.

20. (Original) The method of claim 18, wherein the first electrical response comprises magnitude and phase angle information.

21. (Original) The method of claim 18, wherein the measuring the first electrical response includes measuring an admittance value.

22. (Original) The method of claim 18, wherein the first electrical response comprises a number of frequencies, wherein the number is greater than one.

23. (Original) The method of claim 18, wherein the AC component of the first electrical response has a frequency not less than about 1 Hz and not greater than about 20kHz.

24. (Original) The method of claim 18, further comprising reacting the biological fluid test sample with a reagent.

25. (Original) The method of claim 18, wherein the biological fluid test sample is blood.

26. (Original) The method of claim 18, wherein the measuring the first response occurs before the measuring the second response.

27. (Original) The method of claim 18, wherein the measuring the first response occurs after the measuring the second response.

28. (Original) The method of claim 18, further comprising the steps of:

applying a first test signal to the biological fluid test sample, the first test signal having an AC component; and

applying a second test signal to the biological fluid test sample.

29. (Original) The method of claim 28, wherein the second test signal is a DC signal.

30. (Original) The method of claim 28, wherein the DC signal has a magnitude between about 300 mV and 550mV.

31. (Original) The method of claim 28, further comprising applying the first test signal to the sample before the second test signal.

32. (Original) The method of claim 28, further comprising applying the first test signal to the sample after the second test signal.

33. (Original) The method of claim 28, further comprising applying the first test signal and the second test signal to the test sample at least in part over a common time period.

34. (Original) The method of claim 18, wherein the determining a value indicative of a glucose concentration includes correcting the second electrical response based at least in part upon the first electrical response.

35. (Original) A method for measuring a biological fluid test sample, the method comprising:

measuring a first electrical response of the biological fluid test sample to a first test signal, the first test signal having an AC component;

measuring a second electrical response of the test sample to a second test signal; and

determining a value indicative of a glucose concentration in the test sample based at least in part upon the first electrical response and the second electrical response.

36. (Original) The method of claim 35, wherein the first test signal is an AC signal.

37. (Original) The method of claim 35, wherein the first electrical response comprises magnitude and phase angle information.

38. (Original) The method of claim 35, wherein the measuring the first electrical response includes measuring an admittance value.

39. (Original) The method of claim 35, wherein the first electrical response comprises a number of frequencies, wherein the number is greater than one.

40. (Original) The method of claim 35, wherein the AC component of the first test signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

41. (Original) The method of claim 35, further comprising reacting the biological fluid test sample with a reagent.

42. (Original) The method of claim 35, wherein the biological fluid test sample is blood.

43. (Original) The method of claim 35, wherein the second test signal is a DC signal.

44. (Original) The method of claim 43, wherein the DC signal has a magnitude between about 300 mV and 550mV.

45. (Original) The method of claim 35, wherein the measuring the first response occurs before the measuring the second response.

46. (Original) The method of claim 35, wherein the measuring the first response occurs after the measuring the second response.

47. (Original) The method of claim 35, further comprising applying the first test signal to the sample before the second test signal.

48. (Original) The method of claim 35, further comprising applying the first test signal to the sample after the second test signal.

49. (Original) The method of claim 35, further comprising applying the first test signal and the second test signal to the test sample at least in part over a common time period.

50. (Original) The method of claim 35, wherein the determining a value indicative of a glucose concentration includes correcting the second electrical response based at least in part upon the first electrical response.

51. (Original) A method for determining a concentration of an analyte of a biological fluid, comprising:

applying a first alternating signal to the biological fluid;

measuring a response to the first signal;

applying a second signal having a DC component to the biological fluid;

measuring a response to the second signal; and

analyzing the response to the first signal and the response to the second signal to produce an indication of the concentration of the analyte.

52. (Original) The method of claim 51, wherein the first signal is an AC signal.

53. (Original) The method of claim 51, wherein the response to the first signal comprises magnitude and phase angle information.

54. (Original) The method of claim 51, wherein the measuring the response to the first signal includes measuring an admittance value.

55. (Original) The method of claim 51, wherein the first signal comprises a number of frequencies, wherein the number is greater than one.

56. (Original) The method of claim 51, wherein an AC component of the first test signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

57. (Original) The method of claim 51, wherein the second signal is a DC signal.

58. (Original) The method of claim 57, wherein the DC signal has a magnitude between about 300 mV and 550 mV.

59. (Original) The method of claim 51, further comprising reacting the biological fluid with a reagent.

60. (Original) The method of claim 51, wherein the biological fluid is blood.

61. (Original) The method of claim 51, wherein the measuring the first response occurs before the measuring the second response.

62. (Original) The method of claim 51, wherein the measuring the first response occurs after the measuring the second response.

63. (Original) The method of claim 51, further comprising applying the first test signal to the sample before the second test signal.

64. (Original) The method of claim 51, further comprising applying the first test signal to the sample after the second test signal.

65. (Original) The method of claim 51, further comprising applying the first test signal and the second test signal to the test sample at least in part over a common time period.

66. (Original) The method of claim 51, wherein the producing an indication of the concentration of the analyte includes correcting the second electrical response based at least in part upon the first electrical response.

67. (Original) A method for determining a glucose concentration of a blood sample, comprising:

applying a first signal to the blood sample, the first signal having an AC component;

measuring a first response to the first signal;

applying a second signal to the blood sample, the second signal having an AC component;

measuring a second response to the second signal;

applying a third signal to the blood sample, the third signal having a DC component;

measuring a third response to the third signal; and

determining a value indicative of a glucose concentration in the blood sample based at least in part upon the first response, the second response and the third response.

68. (Original) The method of claim 67, wherein the first test signal is an AC signal.

69. (Original) The method of claim 67, wherein the first response to the first signal comprises magnitude and phase angle information.

70. (Original) The method of claim 67, wherein the second test signal is an AC signal.

71. (Original) The method of claim 67, wherein the second response to the second signal comprises magnitude and phase angle information.

72. (Original) The method of claim 67, wherein the measuring the first response to the first signal includes measuring an admittance value.

73. (Original) The method of claim 67, wherein the measuring the second response to the second signal includes measuring an admittance.

74. (Original) The method of claim 67, wherein the first signal comprises a number of frequencies, wherein the number is greater than one.

75. (Original) The method of claim 67, wherein the AC component of the first test signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

76. (Original) The method of claim 67, wherein the second signal comprises a number of frequencies, wherein the number is greater than one.

77. (Original) The method of claim 67, wherein the AC component of the second test signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

78. (Original) The method of claim 67, wherein the third signal is a DC signal.

79. (Original) The method of claim 78, wherein the DC signal has a magnitude between about 300 mV and 550 mV.

80. (Original) The method of claim 67, further comprising reacting the blood sample with a reagent.

81. (Original) The method of claim 67, wherein the measuring the first response to the first signal and the measuring the second response to the second signal occur before the measuring the third response to the third signal.

82. (Original) The method of claim 67, wherein the measuring the second response to the second signal occurs after the measuring the third response to the third signal.

83. (Original) The method of claim 67, further comprising applying the first signal to the blood sample before the second signal and before the third signal.

84. (Original) The method of claim 67, further comprising applying the third signal to the biological fluid after the first signal and the second signal.

85. (Original) The method of claim 67, further comprising applying the first signal and the third signal to the biological fluid at least in part over a common time period.

86. (Original) The method of claim 67, further comprising applying the second signal and the third signal to the biological fluid at least in part over a common time period.

87. (Original) The method of claim 67, wherein the determining a value indicative of the glucose concentration in the blood sample includes correcting the third response to the third signal based at least in part upon the first response to the first signal and the second response to the second signal.

88. (Original) An apparatus for determining a glucose concentration of a blood sample, comprising

a test chamber adapted to receive the blood sample;

a first electrode circuit adapted to apply a first test signal having an AC component and a second test signal having a DC component to the blood sample upon the sample being received in the test chamber;

a second electrode circuit adapted to measure a first response to the first test signal and a second response to the second test signal; and

a processor adapted to process the first response and the second response to determine a value indicating the glucose concentration of the blood sample.

89. (Original) The apparatus of claim 88, wherein the test chamber is formed upon a disposable test strip.

90. (Original) The apparatus of claim 88, wherein the first electrode circuit comprises:
a potential generator having a generator output;
an electrical connector operatively coupled to the generator output;
a trace formed upon the test strip and operatively coupled to the electrical connector; and
an electrode formed upon the test strip and operatively coupled to the trace.

91. (Original) The apparatus of claim 88, wherein the second electrode circuit comprises:
an electrode formed upon the test strip;
a trace formed upon the test strip and operatively coupled to the electrode;
an electrical connector operatively coupled to the trace; and
an amplifier operatively coupled to the electrical connector.

92. (Original) The apparatus of claim 88, where the processor is a digital microprocessor or microcontroller.

93. (Original) A method for determining a hematocrit value of a blood sample, comprising:
(a) applying a first signal having an AC component to the blood sample;
(b) measuring an AC response to the first signal;
(c) measuring a temperature of the blood sample; and

(d) determining the hematocrit value of the blood sample using the AC response and the temperature.

94. (Original) The method of claim 93, wherein (d) comprises determining the hematocrit value of the blood sample using

$$H_{est} = c_0 + c_1 Y + c_2 dT$$

Where: H_{est} is the hematocrit value,

c_o, c and c_2 are constants,

Y is the AC response (expressed as admittance), and

dT is the temperature value of the blood sample.

95. (Original) The method of claim 93, wherein (d) comprises determining the hematocrit value of the blood sample using

$$H_{est} = (Y + c_0 + c_1 dT)/(c_2 dT + c_3)$$

Where: H_{est} is the hematocrit value,

c_o, c_1 and c_2 are constants,

Y is the AC response (expressed as admittance), and

dT is the temperature value of the blood sample.

96. (Original) The method of claim 93, wherein the first signal is an AC signal.

97. (Original) The method of claim 93, wherein the AC component of the first signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

98. (Original) The method of claim 93, wherein the first signal is approximately a 2kHz AC signal.

99. (Original) The method of claim 93, further comprising the steps of:

e) applying a second signal to the blood sample, wherein the second signal is a DC signal;

f) measuring a DC response to the second signal; and

g) combining the hematocrit value, the temperature, and the DC response to produce an indication of a glucose concentration of the blood sample.

100. (Original) The method of claim 99, wherein the first signal is an AC signal.

101. (Original) The method of claim 99, wherein the first signal and the second signal are applied at least partially simultaneously.

102. (Original) The method of claim 99, wherein the AC component of the first signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

103. (Original) The method of claim 99, wherein step (g) comprises determining the glucose concentration using

$$PRED = (a_0 + hct_1H_{est} + hct_2H_{est}^2 + tau_1 dT + tau_2 dT^2)$$
$$+ (a_1DC)(1 + hct_3H_{est} + hct_4H_{est}^2)(1 + tau_3 dT + tau_4 dT^2)$$

Where: PRED is the glucose concentration,

DC is the DC response,

a_0, a_1, hct, hct_2, hct_3, hct_4, tau_1, tau_2, tau_3 and tau_4 are constants,

H_{est} is the hematocrit value, and

dT is the temperature value.

104. (Original) A method for determining a glucose concentration of a blood sample, comprising:

applying an alternating potential to the blood sample;

measuring a first response to the alternating potential;

applying a DC potential to the blood sample;

measuring second response to DC potential;

determining a first value relating to a hematocrit content of the blood sample using the first response;

determining a second value relating to the temperature of the blood sample using the first value and the first response; and

determining a third value relating to the glucose concentration of the blood sample using the first value, the second value, and the second response.

105. (Original) The method of claim 104, wherein the alternating potential is an AC signal.

106. (Original) The method of claim 104, wherein the alternating potential and the DC potential are applied at least partially simultaneously.

107. (Original) The method of claim 104, wherein the first response comprises magnitude and phase angle information.

108. (Original) The method of claim 104, wherein the alternating potential comprises a number of frequencies, wherein the number is greater than one.

109. (Original) The method of claim 108, wherein the number is not less than two and not greater than five.

110. (Original) The method of claim 108, wherein the number is not less than two and not greater than ten.

111. (Original) The method of claim 108, wherein the number is greater than ten.

112. (Original) The method of claim 104, wherein an AC component of the alternating potential has a frequency not less than about 1 Hz and not greater than about 20kHz.

113. (Original) The method of claim 104, wherein said alternating potential comprises n alternating potentials, and wherein said determining a first value comprises determining the hematocrit value using

$H_{est} = c_0 + c_1\Phi_1 \ldots c_n\Phi_n$

Where: H_{est} is the hematocrit value,

c_0, c_1 ... c_n are constants, and

$\Phi_1 \ldots \Phi_n$ are respective AC phase angle responses
to each of the n first signals.

114. (Original) The method of claim 104, wherein said determining a third value comprises determining the glucose concentration using

$PRED = (a_0 + hct_1 H_{est} + hct_2 H_{est}^2 + tau_1 dT + tau_2 dT^2)$

$+ (a_1 DC)(1 + hct_3 H_{est} + hct_4 H_{est}^2)(1 + tau_3 dT + tau_4 dT^2)$

Where: PRED is the glucose concentration,

DC is the second admittance response,

a_o, a_1, hct, hct_2, hct_3, hct_4, tau_1, tau_2, tau_3 and tau_4 are constants,

H_{est} is the hematocrit value, and

dT is the temperature value.

115. (Original) A method for determining a glucose concentration of a blood sample, comprising the steps of:

a) applying a first signal having an AC component to the blood sample;

b) measuring an AC response to the first signal;

c) applying a second signal to the blood sample, wherein the second signal is a DC signal;

d) measuring a DC response to the second signal;

e) determining a hematocrit value of the blood sample using the AC response;

f) determining an estimated temperature of the blood sample using the hematocrit value and the AC response; and

g) determining the glucose concentration of the blood sample using the hematocrit value, the estimated temperature, and the DC response.

116. (Original) The method of claim 115, wherein the first signal is an AC signal.

117. (Original) The method of claim 115, wherein the first signal and the second signal are applied at least partially simultaneously.

118. (Original) The method of claim 115, wherein the first admittance response comprises magnitude and phase angle information.

119. (Original) The method of claim 115, wherein the first signal comprises a number of frequencies, wherein the number is greater than one.

120. (Original) The method of claim 119, wherein the number is not less than two and not greater than five.

121. (Original) The method of claim 119, wherein the number is not less than two and not greater than ten.

122. (Original) The method of claim 119, wherein the number is greater than ten.

123. (Original) The method of claim 115, wherein the AC component of the first signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

124. (Original) The method of claim 115, wherein said first signal comprises n first signals, and wherein step (e) comprises determining the hematocrit value using

$H_{est} = c_0 + c_1\Phi_1 \ldots c_n\Phi_n$

Where: H_{est} is the hematocrit value,

c_0, c_1 … c_n are constants, and

$\Phi_1 \ldots \Phi_n$ are respective AC phase angle responses to each of the n first signals.

125. (Original) The method of claim 115, wherein step (g) comprises determining the glucose concentration using

$PRED = (a_0 + hct_1H_{est} + hct_2H_{est}^2 + tau_1dT + tau_2dT^2)$

$+ (a_1DC)(1 + hct_3H_{est} + hct_4H_{est}^2)(1 + tau_3dT + tau_4dT^2)$

Where: PRED is the glucose concentration,

DC is the second admittance response,

a_o, a_1, hct, hct_2, hct_3, hct_4, tau_1, tau_2, tau_3 and tau_4 are constants,

H_{est} is the hematocrit value, and

dT is the temperature value.

126. (Original) A method for determining a glucose concentration of a blood sample, comprising:

a) providing the blood sample, wherein the blood sample has a minimum sample volume of less than or equal to 0.4 μl;

b) applying a signal having an AC component to the blood sample;

c) measuring an AC response to the signal; and

d) determining the glucose concentration of the blood sample using at least the AC response wherein the determination has a Total Test Time of within about 3 seconds or less.

127. (Original) The method of claim 126, wherein said Total Test Time is within about 1.9 seconds or less.

128. (Original) The method of claim 126, wherein said Total Test Time is within about 1.5 seconds or less.

129. (Original) The method of claim 126, wherein said Total Test Time is within about 1.1 seconds or less.

130. (Original) The method of claim 126, wherein the signal is an AC signal.

131. (Original) The method of claim 126, wherein the AC response comprises magnitude and phase angle information.

132. (Original) The method of claim 126, wherein the AC response comprises phase angle information.

133. (Original) The method of claim 126, wherein the signal comprises a number of frequencies, wherein the number is greater than one.

134. (Original) The method of claim 133, wherein the number is not less than two and not greater than five.

135. (Original) The method of claim 133, wherein the number is not less than two and not greater than ten.

136. (Original) The method of claim 133, wherein the number is greater than ten.

137. (Original) The method of claim 126, wherein the AC component of the signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

138. (Original) A method for determining a glucose concentration of a blood sample, comprising:

a) applying a signal having an AC component to the blood sample;
b) measuring an AC response to the signal; and
c) determining the glucose concentration of the blood sample using at least the AC response wherein the determination has a Total Test Time of within about 5.5 seconds or less.

139. (Original) The method of claim 138, wherein said Total Test Time is within about 3 seconds or less.

140. (Original) The method of claim 138, wherein said Total Test Time is within about 1.9 seconds or less.

141. (Original) The method of claim 138, wherein said Total Test Time is within about 1.5 seconds or less.

142. (Original) The method of claim 138, wherein said Total Test Time is within about 1.1 seconds or less.

143. (Original) The method of claim 138, wherein the signal is an AC signal.

144. (Original) The method of claim 138, wherein the AC response comprises magnitude and phase angle information.

145. (Original) The method of claim 138, wherein the AC response comprises phase angle information.

146. (Original) The method of claim 138, wherein the signal comprises a number of frequencies, wherein the number is greater than one.

147. (Original) The method of claim 146, wherein the number is not less than two and not greater than five.

148. (Original) The method of claim 146, wherein the number is not less than two and not greater than ten.

149. (Original) The method of claim 146, wherein the number is greater than ten.

150. (Original) The method of claim 138, wherein the AC component of the signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

151. (Original) A method for determining the concentration of a medically significant component of a biological fluid comprising:
providing a cell for receiving a sample of the fluid;
providing on the cell a chemistry which reacts with the medically significant component and first and second terminals across which the reaction of the chemistry with the medically significant component can be assessed;

providing an instrument having first and second terminals complementary to the first and second terminals, respectively, of the cell, placement of the first and second terminals of the cell in contact with the first and second terminals, respectively, of the instrument permitting the instrument to assess the reaction; and

providing in the instrument an assessment controller configured to apply across the first and second terminals of the instrument a first signal, determine the identity of the sample in response of the cell to the first signal, and produce an indication of the identity of the sample.

152. (Original) The method of claim 151, wherein the first signal includes an AC component.

153. (Original) The method of claim 151, wherein the first signal is an AC signal.

154. (Original) A method for determining the concentration of a medically significant component of a biological fluid comprising the steps of:

(a) applying a first signal having an AC component to the biological fluid;

(b) measuring a first response to the first signal; and

(c) determining an identity of the biological fluid based upon the first response.

155. (Original) The method of claim 154, wherein the first signal is an AC signal.

156. (Original) The method of claim 154, wherein the first response comprises magnitude and phase angle information.

157. (Original) The method of claim 154, wherein the first response comprises an admittance measurement.

158. (Original) The method of claim 154, wherein the AC component of the first signal has a frequency not less than about 1 Hz and not greater than about 20kHz.

159. (Original) The method of claim 154, wherein the biological fluid is blood.

160. (Original) The method of claim 154, further comprising the step of reacting the biological fluid with a reagent.